CLAIMS

WHAT IS CLAIMED IS:

1. A method for managing a communication buffer in a local host communicating with a remote host, the method comprising:
   a. receiving from the remote host a received message having a received message identifier therein;
   b. determining whether the communication buffer is in a predetermined buffer state, the communication buffer including one of committed memory, free memory, and a combination thereof, a portion of committed memory storing a transmitted message copy;
   c. if the communication buffer is in a predetermined buffer state, then storing the received message;
   d. if the communication buffer is not in a predetermined buffer state, then designating the received message identifier as a release identifier; and
   e. denominating as free memory the portion of committed memory storing the transmitted message copy associated with the release identifier.

2. The method of Claim 1, wherein the predetermined buffer state comprises free memory being less than a predetermined memory threshold; wherein the transmitted message copy includes a corresponding transmitted message identifier characterized by a defined relationship with the release identifier.

3. The method of Claim 1, wherein the received message includes a header and a payload, and further comprising extracting the received message identifier from the header of the received message.

4. The method of Claim 3, wherein the received message and the transmitted message copy comprise Transmission Control Protocol segments.

5. The method of Claim 2, wherein the portion of committed memory stores transmitted message copies, each of the transmitted message copies includes a corresponding transmitted message identifier, and selected corresponding

transmitted message identifiers are characterized by the defined relationship with the release identifier; wherein the defined relationship comprises ordinality of selected corresponding transmitted message identifiers being less than ordinality of the release identifier; and wherein the portion of committed memory storing transmitted message copies having the selected corresponding transmitted message identifiers is denominated as free memory.

6. The method of Claim 5, wherein receiving from the remote host the received message wherein the message protocol further comprises a reliable response-type end-to-end message protocol.

7. The method of Claim 6, wherein the reliable response-type end-to-end message protocol comprises a positive acknowledgement-based protocol.

8. The method of Claim 7, wherein the positive acknowledgement-based protocol comprises a Transmission Control Protocol-based protocol, and wherein the received message and the transmitted message copies comprise Transmission Control Protocol segments.

9. The method of Claim 8, wherein the release identifier comprises a received message acknowledgement number, wherein selected corresponding transmitted message identifiers comprise selected corresponding transmitted message acknowledgement numbers, wherein the received message acknowledgement number and the selected transmitted message acknowledgement numbers are arranged in a defined acknowledgement number sequence, and wherein ordinality of the received message acknowledgement number is greater than ordinality of the selected corresponding transmitted message acknowledgement numbers.

10. A mobile communication device, comprising:

a. a communication buffer including one of committed memory, free memory, and a combination thereof; and

b. a memory controller controllably connected with the communication buffer, and adapted to denominate a selected memory location as one of free memory and committed memory;

wherein the selected memory location is denominated as free memory and wherein a transmitted message copy is stored in the selected memory location;

wherein the memory controller denominates the selected memory location as committed memory responsive to the transmitted message copy being stored therein; and

wherein the transmitted message copy contains a transmitted message identifier discernable to the memory controller to denominate the selected memory location as one of committed memory and free memory responsive to a response indicant.

11. The mobile communication device of Claim 10, wherein the communication buffer further comprises a transmit buffer having one of committed transmit memory, free transmit memory, and a combination thereof;

wherein selected transmit memory locations are denominated by the memory controller as free memory, wherein transmitted message copies of transmitted messages communicated to a remote host are stored in the selected transmit memory locations, and wherein the selected transmit memory locations are denominated as selected committed transmit memory locations responsive to the copies being stored;

wherein the memory controller monitors the transmit buffer for a predetermined buffer state;

wherein the response indicant is a received message identifier communicated from the remote host in a received message and is associated with the selected committed transmit memory locations; and

wherein, if the predetermined buffer state exists, the received message identifier causes the memory controller to denominate selected committed transmit memory locations as free memory.

12. The mobile communication device of Claim 11,

wherein the mobile communication device comprises a local host executing a local communications process and the remote host executes a remote communications process in communication with the local process;

wherein the local communications process and the remote communications process are bidirectional, reliable, response-type, end-to-end communication processes;

wherein the transmitted message copies and received message each comprise a payload and a header, wherein headers of the transmitted message copies include respective corresponding transmitted message identifiers, and wherein the header of the received message includes a received message identifier; and

wherein the received message identifier has a defined relationship with the respective corresponding transmitted message identifiers.

13. The mobile communication device of Claim 12,

wherein the local and remote processes comprise Transport Control Protocol (TCP) processes;

wherein the transmitted message copies and the received message comprise TCP segments;

wherein the transmitted message identifiers and the received message identifier are TCP acknowledgement numbers (ACKNUM); and

wherein the defined relationship comprises ACKNUM arranged in an ordered numerical sequence in which ordinality of the transmitted message identifiers is less than ordinality of the received message identifier.

14. The mobile communication device of Claim 13, wherein the predetermined buffer state comprises free transmit memory being less than a predetermined memory threshold.

15. The mobile communication device of Claim 14, wherein the communication buffer further comprises a receive buffer having a predetermined number of

receive memory locations including one of committed receive memory locations, free receive memory locations, and a combination thereof,

wherein received messages communicated from the remote process are stored in selected free receive memory locations in the receive buffer with the selected free receive memory locations being denominated as selected committed receive memory locations thereby,

wherein the local process transmits an acknowledgement of a received message;

wherein the receive buffer is monitored by the memory controller, and

wherein the received message identifier corresponds to one of the selected committed transmit memory locations.

16. The mobile communication device of Claim 14, wherein the data payload is unused and the local process does not transmit to the remote process the acknowledgement of a received release message.

17. The mobile communication device of Claim 10, wherein the communication buffer further comprises transmit buffers each having one of committed transmit memory, free transmit memory, and a combination thereof;

wherein respective selected transmit memory locations in respective selected transmit buffers are denominated as free transmit memory by the memory controller;

wherein selected transmitted message copies of selected transmitted messages communicated to a remote host are stored in the respective selected transmit memory locations;

wherein the selected transmit memory locations are denominated as committed transmit memory locations when the copies are stored;

wherein the selected committed transmit memory locations are associated with respective response indicants, and each of the respective response indicants comprises a respective received message identifier communicated from the remote host in a respective received message;

wherein the memory controller monitors each of the transmit buffers for a respective predetermined buffer state; and

wherein, if the respective predetermined buffer state exists, the respective received message identifier causes the memory controller to denominate the selected committed transmit memory locations as free memory.

18. The mobile communication device of Claim 16, further comprising a transceiver connected with the communication buffer, the local process bidirectionally communicating messages through the transceiver with the remote process.

19. The mobile communication device of Claim 18, wherein the transceiver communicates with the remote process using a preselected wireless communication protocol.

20. The mobile communication device of Claim 19, wherein at least a portion of the communication network over which the local process communicates with the remote process comprises a public packet-switched network.

21. A communication method for a mobile, memory-constrained local host, the method comprising:

a. transmitting transmitted messages from a local host communicating to a remote host using a preselected reliable, end-to-end communication protocol;

b. storing, in selected memory locations of a memory-constrained local host communication buffer, copies of the transmitted messages, each transmitted message copy including a respective transmitted message identifier therein, the communication buffer containing a predetermined number of memory locations denominated as one of committed memory, free memory, and a combination thereof, and the selected memory location being in free memory;

c. denominating selected memory locations to be in committed memory responsive to the storing;

d. receiving from the remote host a received message having a received message identifier therein;

e. monitoring a communication buffer status for a predetermined buffer state;

f. if the communication buffer status is in the predetermined buffer state, then storing the received message in the communication buffer;

g. if the communication buffer is not in the predetermined buffer state, then releasing the communication buffer to the predetermined buffer state, wherein the releasing includes:

(1) designating the received message identifier as a release identifier;

(2) denominating as free memory, committed memory in which a transmitted message identifier corresponds to the release identifier.

22. The method of Claim 21, wherein the communication buffer status comprises the amount of committed memory being below a preselected committed memory threshold.

23. The method of Claim 22, wherein the received message comprises a header and a payload, and further comprising extracting the received message identifier from the header of the received message, the received message identifier having a defined relationship to a transmitted message identifier in a transmitted message copy stored in committed memory.

24. The method of Claim 23, wherein the preselected reliable end-to-end communication protocol for communicating between the local host and the remote host comprises a preselected reliable positive acknowledgement-based end-to-end communication protocol, wherein protocol acknowledgements contain message identifiers defined over a numerical sequence.

25. The method of Claim 24, wherein transmitted message identifiers are defined over the numerical sequence and the release identifier is selected from one message identifier in the numerical sequence corresponding to one of the transmitted messages received by the remote host.

26. The method of Claim 25, wherein the preselected reliable positive acknowledgement-based end-to-end communication protocol comprises a TCP protocol.

27. The method of Claim 21, wherein the preselected end-to-end communication protocol for the local host communicating to the remote host comprises a reliable, positive acknowledgement-based, end-to-end TCP communication protocol, wherein transmitted message identifiers are defined over a numerical sequence and wherein a protocol acknowledgement contains a release identifier selected from the numerical sequence corresponding to one of the transmitted messages received by the remote host.

28. The method of Claim 27, wherein the local host communicates with the remote host over the U_m interface, and wherein the preselected end-to-end communication protocol further comprises a preselected wireless communication protocol.

29. A telecommunication method, comprising:

a. receiving, from a remote host by a local host, an acknowledgement having an acknowledgement sequence number, the acknowledgement sequence number indicating to the local host a next selected message to transmit to the remote host and a selected previously unacknowledged message received by the remote host, the selected previously unacknowledged message being stored in a selected memory location in a communication buffer and the selected memory location being reversibly write-inhibited;

b. monitoring the communication buffer for a predetermined buffer state; and

c. if the communication buffer is in the predetermined buffer state, then reversibly write-enabling the selected memory location in which the selected previously unacknowledged message indicated by the acknowledgement sequence number is stored.

30. A communication system, comprising:

a. memory adapted to buffer copies of ordered messages transmitted to a remote device over a packet-switched network;

wherein unacknowledged copies are buffered in memory denominated as committed memory, the committed memory being reversibly write-inhibited;

wherein the remote device returns an acknowledgement of the ordered messages received by the remote device over the packet-switched network,

wherein the acknowledgement includes a response indicant acknowledging a selected ordered message in the communication; and

b. a differential processing memory controller configured to examine the response indicant, responsive to a preselected memory state,

wherein the response indicant acknowledges copies in selected committed memory,

wherein the memory controller denominates selected memory associated with the response indicant as free memory, the free memory being reversibly write-enabled; and

wherein the memory and differential processing memory controller are constituents of a mobile wireless communication device.

31. The communication system of Claim 30, wherein the ordered messages are transmitted to the remote device over the packet-switched network using a reliable, positive acknowledgement-based, end-to-end communication protocol.

32. The communication system of Claim 31, wherein the end-to-end communication protocol comprises a TCP communication protocol.

33. The communication system of Claim 30, wherein the differential processing memory controller further comprises:

a. a counter connected with the memory,

wherein the memory includes a constrained number of memory locations,

wherein the ordered messages are arranged in a defined numerical sequence,

wherein the preselected memory state is indicative of free memory locations being fewer than a predetermined free memory threshold, and

wherein the counter provides a first state signal declarative of the preselected memory state; and

b. a commit directory connected with the memory and receiving the first state signal, the commit directory configured to denominate each of the constrained number of memory locations as one of a free memory and a committed memory, the commit directory denominating the selected memory as committed memory when unacknowledged copies are buffered therein and, responsive to the state signal, as free memory.

34. The communication system of Claim 33, wherein the differential processing memory controller further comprises a mapper configured to receive the response indicant and adapted to produce in response a second state signal, wherein the commit directory denominates the selected memory of committed memory as free memory, further responsive to the second state signal.

35. The communication system of Claim 31, wherein the differential processing memory controller is adapted to statically allocate committed memory and free memory.

36. The communication system of Claim 31, wherein the differential processing memory controller is adapted to dynamically allocate committed memory and free memory.